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THE INTERNATIONAL NOTATION FOR TAPPING SYSTEMS and its use in the TABULATION OF YIELD RECORDS

BY

EVAN GUEST

I. Summary

1. The development of the new International Notation for Tapping Systems set forth in the article which follows (Communication 240) is explained.

2. Objections to the old haphazard notations are mentioned and the importance of clearly defining tapping systems by standard symbols is stressed.

3. Reasons are given for the subdivision of the notation under (1) number, (2) length and (3) type of cut, (4) frequency of tapping, (5) periodicity and (6) relative intensity. Further elaborations to deal with (7) change-over tapping are explained.

4. Other factors which play a part in tapping are mentioned, notably height of cut and bark consumption. Concise methods of recording them are suggested.

5. Brief notes are given on the tabulation of yield records with special reference to the conception of tapping intensity.

6. A broad classification of tapping systems is set forth on the basis of the factors symbolised in the notation.

II. Introduction

When a famous statesman said " Speech is given us to conceal our thoughts " he might have added that thought is often obscured by words unspoken.

Language is the fluid vehicle of expression in which word meanings are perpetually changing. While ideas run ahead there is a lag in the framing of words as symbols for things in mind: thought is however itself impeded by confused symbolism and by sub-conscious association of discarded meanings.

To express ideas clearly writers must search out precise phrases: readers cannot however understand unless they are familiar with the same usage of the language. That words may be deliberately twisted to conceal thoughts is patent enough, but

the deadly obscurity cast over the mind by misuse of word symbols is more insidious.

Handicapped by the changing meanings of words, writers cannot express themselves clearly unless they constantly take stock of their terms and redefine their symbols. Writing in the present, they must keep one eye on the future and the other on the past. At their disposal is language covering the whole field of knowledge: their task is to select apposite terms within the scope of a particular subject.

This article is concerned only with one small facet of expression—the problem of how to define unequivocally and succinctly the numerous systems of tapping rubber trees. Its object is to show both the need for a standard notation and for clearer thought on the factors involved in tapping, while setting forth the basis on which the new unified scheme of notation has been built.

The use of symbols as short-hand descriptions for systems of tapping is not new nor is the proposed notation final; it will no doubt require revision in its turn. It has been devised primarily to meet the needs of the moment, but with a view to further development. As an international form of expression it should eliminate misunderstanding between those who write in different languages.

Origin of former notations

It is difficult to trace exactly how and where existing symbols originated. Herbert Wright, over thirty years ago (1906), mentioned the symbols "V" and "Y" to denote types of tapping cuts. Reference to the symbol "X" for another type of cut, which has long been obsolete, can also be found. The common abbreviation "a.d." for alternate-daily tapping does not, however, appear in the literature until quite recently, although the Dutch equivalent "o.d.a.d." began to be used in yield tables at least a dozen years ago (Bally, 1928). Similar abbreviations to denote frequency and periodicity of tapping, such as "o.d.d.d." or "o.d.3d.", "o.d.20d.", "o.d.30.d." etc. have also been used (Tengwall, 1931; van Baalen, 1935). The notation "A.B.C." for the Malayan system of alternate-daily periodic tapping was introduced by C. R. Harrison (1925; see also Spring, 1925). The idea of "relative value" of tapping systems appeared in an article by R. Garnier (1922); his relative value was similar to "relative intensity" in the new notation, but based on a different scale.

As tapping technique developed individuals may have devised short-hand forms of their own to designate the various systems. Such notations were no doubt used locally at first; some of the symbols would then have gained wider recognition and finally reached more or less universal adoption.

THE PRESENT POSITION

Symbols to define the length and type of cut, such as ½V, ¼S, etc. and the common abbreviations for "alternate-daily tapping" — a.d. or A.D. in Malaya and Ceylon and a.d. or o.d.a.d. in the Netherlands East Indies *— have been used for some years and are well understood. The terms A.B., A.B.C. etc. to denote the sub-division of an area into two, three or more sections for periodic tapping and rest, are also current in the major rubber-producing countries, but, unfortunately, do not have the same significance in our Malayan notation as on the East Coast of Sumatra. A more recent innovation in Malaya and Ceylon is the habit of indicating the number of months tapped and rested on periodic systems in the form 6/3, 12/6, 24/12 and so on.

The origin of abbreviations is easy to understand. It is shorter to write "½S,a.d,A.B.C.6/3" (or by a further abbreviation "A.B.C. 6/3") than to go into the detailed explanation "*a half-circumference spiral cut tapped alternate-daily for six months, followed by three months' rest—area subdivided into three sections, one of which is rested and the other two in tapping.*" Moreover the symbols jump to the eye; and their significance can be grasped more quickly than the meaning of the string of words.

MISUSE OF SYMBOLS

That lack of thought can lead to confusion of symbols, and misuse of symbols in turn to confusion of thought, is illustrated by the common habit of contrasting "a.d. tapping" and "A.B.C. tapping" in Malaya. What is meant of course is to compare "continuous" with "periodic" tapping. In this country continuous alternate-daily tapping on a half circumference was in vogue when periodic rests were introduced on the "A.B.C. system." Writers then abbreviated ½S,a.d,A.B.C. to "A.B.C.", while the abbreviation "a.d." was taken to mean continuous tapping, ignoring that the term A.B.C. also implied a.d. frequency. Abbreviation of a formula cannot itself be criticised when there is no risk of confusion; in this example, the abbreviations "continuous tapping" and "A.B.C. tapping" would have been permissible, a uniform length of cut and frequency (½S,a.d.) being understood in both systems. Had those who compared "a.d." with "A.B.C." troubled to define their symbols explicitly, they would not have been guilty of this rather slipshod inconsistency.

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*The Dutch words represented by a.d. and o.d.a.d. are "**a**nder **d**aagsch" and "**o**m **d**en **a**nderen **d**ag." The other Dutch abbreviations mentioned above stand for "**o**m **d**en **d**erden **d**ag" (o.d.d.d.), "**o**m **d**e **20 d**agen" (o.d. 20d) etc.

Disadvantages of casual symbols

The chief drawback of the undefined notations of the past has been that they could be, and frequently were, misunderstood. Similar confusion would result if people tried to communicate in semi-private languages without a proper understanding of each other's vocabulary.

Compare, for example, the conflicting A.B.C. notations used in Malaya and on the East Coast of Sumatra. The original confusion arose in the following manner. In Malaya continuous *alternate-daily* tapping had become standard practice, so that the terms A.B., A.B.C., A.B.C.D. etc. were applied exclusively to *periodic systems* on which a half, a third, a quarter of the area was rested, while the remainder was under a.d. tapping.

In Sumatra, on the other hand, when continuous daily tapping proved too severe, *daily* periodic tapping had been introduced. There was thus no need to distinguish between continuous and periodic systems on the Sumatran notation: alternate-daily (that is, tapping for one day, followed by one day's rest) could as logically be designated an A.B. system as daily alternate-monthly (that is, tapping daily for one month, followed by one month's rest). Similarly, third-daily became A.B.C. tapping in Sumatra, fourth-daily A.B.C.D. and so on. The notation was applied indiscriminately to all tapping systems on which a half, a third or a quarter of the area was tapped on any given day—the more letters, the greater the proportion of the area resting daily (and the less intense the system), in contrast to the Malayan notation on which each additional letter indicated a decrease in the area resting (and a corresponding increase in intensity). As an example of the incongruity of the two notations, a periodic system with alternate-daily tapping for five months, followed by five month's rest, would be described as A.B. tapping in Malaya but as A.B.C.D. tapping in Sumatra.

Remembering that many writers failed to mention the length of the tapping cut, we can scarcely be surprised that past literature on experiments with *Hevea* bristles with confusion. Though the frequency of tapping may be understood by those familiar with normal practice in the country under reference, the intensity of the system may still remain in doubt. The Sumatran notation is perhaps the more logical of the two, since it does indicate the number of units into which an area has to be divided for daily tapping. But either set of A.B.C. symbols will be better replaced by the clearer designation of intensity in the new notation (vide pp. 151-152).

While languages grow by imperceptible twists of expression as words acquire inflections of meaning, the symbols of a notation should be interpreted in accordance with deliberate definitions. Once fixed, no deviation from the standard interpretation can be tolerated, unless explicitly defined for a particular purpose: or, if suggested for more permanent use, until it has been formally approved and incorporated in the notation.

The development of international symbols

To bring order into this subject, the introduction of a standard notation was suggested early this year. Draft proposals,

based so far as possible on symbols in widest current use, were sent for comment to the rubber research organisations in Ceylon and the Netherlands East Indies. The advice of one or two prominent members of the planting communities in Malaya and Indo-China was also sought.

The proposed introduction of standard symbols met at once with universal approval. Many valuable suggestions were received for simplifying the draft notation. The writer was fortunate in being able to discuss the matter with Mr. R. K. S. Murray of the Rubber Research Scheme towards the end of February, 1939, during a short visit to Ceylon. Early in May, Dr. W. H. de Jong of the Proefstation, Midden en Oost Java, happened to be visiting Malaya; it was with his collaboration that the new international notation emerged in more or less final form. Another profitable discussion took place in June with Dr. A. d'Angremond, Director of the Algemeen Proefstation der A.V.R.O.S., Sumatra, who was then in Kuala Lumpur. After further correspondence with the Chairman of the Central Association of the Experiment Stations in the Netherlands East Indies and the Director of the Rubber Research Scheme, Ceylon, general agreement was reached.

In the final form in which it appears in Communication 240, the notation has been formally adopted by the rubber research organisations of Java, Sumatra, Malaya and Ceylon. It will henceforth be used in official publications in all four countries. We hope that it will also find ready acceptance among the various planting communities. Adherence to a unified scheme of notation will much simplify future literature on tapping and allied subjects. It should moreover assist the development of a clearer conception of the differences between the various systems of tapping.

III. The Standard Notation

Precise details of the new international notation will be given in the next article. In order to state the reasons of our final choice of terms it will be convenient to recapitulate the main features here; possible developments and complications will also be considered.

Systems of tapping are different methods of harvesting the latex crop. They are based on combinations of many factors, some of greater, others of lesser importance. The notation has been designed to represent five of these factors by standard symbols. A sixth symbol, the percentage figure denoting relative intensity, indicates an integration of the five. Special symbols may also be inserted to designate change-over systems of tapping. Factors not represented by symbols in the standard notation will be considered in Section IV.

(1) Number and (2) Length of Cuts

It should not be necessary to emphasise the importance of stating the amount of cut; but, unfortunately, this elementary point is not always appreciated, even in technical journals. It is irritating to find yield tables under the bare heading "a.d. tapping" or "alternate-monthly tapping" and to have to guess the length of cut, usually a half cut in Malaya and Ceylon, often a third cut in Java and Sumatra, but not invariably. Though it may be possible to make a reasonable guess at the length understood, such an element of vagueness should find no place in a scientific publication.*

(a) *Single-cut tapping*

The use of the common fractions, $\frac{1}{2}$, 1/3 and $\frac{1}{4}$, to denote the horizontal length of a single cut, expressed as a fraction of the circumference, needs no comment since it has been the universal practice for many years. The symbols 1/1 for one full-circumference cut are a logical extension of this notation.†

(b) *Multiple-cut tapping*

Tapping of two or more cuts on one tree *at the same time* is indicated by the numerator, greater than 1, of a fraction whose denominator denotes the length of each individual cut—for example, 2/2 for two half-cuts, 3/3 for three one-third-cuts, 4/2 for four half-cuts etc. Systems with more than two cuts tapped at a time are rarely used except in slaughter tapping, but 2/2 is common in such economic systems as the "Double Three" or "Sunderland" (periodic tapping on two half-cuts every third day)

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* Discreet omissions from a formula are certainly permissible where there is no risk of ambiguity. For example, when comparative yields are tabulated from tapping systems with different frequencies or periodicities, *but uniform cuts*, there is no need to repeat the fraction "number of cut/length" in the formula at the head of each column or whenever the tapping systems are referred to in the text, provided this information is prominently stated at the foot of the table.

† Note that we are not dealing with a mathematical formula the sense of which is unaffected by the omission of unity: omission of the digits 1/1 might be regarded as accidental and thought to imply a half cut, since a half is the most common length.

Cuts longer than a full circumference are unlikely to be used in tapping. Should some new system be invented, however, with an overlapping cut, say on a full circumference and a third, the notation could be extended. One and a third cuts would have to be expressed as 1/0.75, one and a half cuts as 1/0.67 and so on (derived from "1/ reciprocal 4/3" and "1/ reciprocal 3/2" respectively, a logical extension of the new notation—vide p. 165). Long cuts such as these may conceivably be used in slaughter tapping.

and the "Double Four" (periodic tapping on two half-cuts every fourth day).

The relative positions of multiple cuts may be indicated, when desired, by specifying each cut separately along with special symbols of position, defined as follows: on opposite panels (+), superimposed on the same panel (−) and in echelon on adjacent panels(/). For example, 2/2 might stand for $\frac{1}{2}+\frac{1}{2}$ or $\frac{1}{2}-\frac{1}{2}$, 2/4 for $\frac{1}{4}+\frac{1}{4}$ or $\frac{1}{4}/\frac{1}{4}$—and may be so specified, if desired. Further examples, showing how specific cut symbols should be introduced into the full formula, will be given later (footnote on p. 153).

Systems with two or more cuts on one tree, *not* tapped at the same time, are considered as "change-over systems" and dealt with in a later section (p. 152).

(3) Type of cut

Omission of the S or V, to indicate the type of cut, is fairly frequent, but these symbols should be recorded. The full-circumference spiral cut is represented by 1/1S; the full-circumference extended V, usually formed by extending the left arm of a $\frac{1}{2}$V cut upwards for another half-circumference, can be written 1/1V.

The old fashioned haphazard herring-bone and winding spiral cuts could be designated by double symbols (VV and SS); the approximate number of cuts on these systems would be indicated by their relative intensities. Should new types of cut be devised, appropriate symbols could be added to the notation.

(4) Frequency of tapping

Logically there is only a difference in degree between the rests of one, two, three or four days between tappings on "continuous" systems and the longer resting periods, of from a fortnight to six months or over, on "periodic" systems.

Nevertheless, it is convenient to separate "minor periodicity" or frequency of tapping from the "major periodicity" of a sequence of distinct tapping and resting periods, artificial though the difference may be. Without this distinction many complications would arise in symbolising tapping systems on a standard notation. That the importance of the separation has not been sufficiently appreciated hitherto is indicated by indiscriminate use of the symbols A.B., A.B.C. etc. to cover both continuous and periodic systems in Sumatra and by slipshod comparison of a.d. or A.D. with "A.B.C. tapping" in Malaya.

To break away from puzzling associations of the past it is proposed invariably to use in the standard notation the small letter d, *not* the capital D, and to designate frequency as d., a.d. or 2d., 3d., 4d., etc. Since the abbreviation a.d. is already well established

in Malaya, Ceylon and the Netherlands East Indies, it is not considered advisable to insist on the substitution of the more logical alternative "2d." at the moment. When users become familiar with the standard notation, however, they will perhaps gradually substitute "2d." of their own accord so that the term a.d. may eventually drop out

(5) Periodicity

Having separated the notations of frequency and periodicity all tapping systems fall into one or other of two classes: continuous and periodic.

(a) *Continuous tapping*

This is usually indicated by mere omission of periodicity symbols. Where it is particularly desired to emphasise that a system is continuous, however, the symbol ∞ could be inserted after frequency.

(b) *Periodic tapping*

Periodic systems can conveniently be grouped by frequency as daily periodic, alternate-daily periodic, third-daily periodic and so on. If the periods of tapping and rest are stated after the notation of frequency in the form 20/40d (=days), 3/3w (=weeks), 6/3m (=months) etc.—the tapping period always preceding the period of rest—further details are unnecessary. The number of sections into which the area is subdivided can readily be deduced from these symbols. There is no reason why the custom of subdividing estates into A, B, C, D . . . . sections for convenience of tapping organisation should not continue, but A, B, C symbols should no longer encumber the notation.*

(6) Intensity

The conception of intensity is an important adjunct to evaluation of the effects of tapping and comparison of one system with another. A distinction between absolute intensity and relative intensity should be recognised at the outset. The value called *relative* intensity is used in the international notation; it integrates the expected comparison of one system with another under uniform conditions. The value called *absolute* intensity on the other hand cannot be determined until after the event; it integrates tapping history under actual past conditions.

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* For suggested abbreviations to replace general terms for groups of systems such as "ABC tapping," see pp. 151-152.

(a) *Absolute intensity*

Absolute intensity can conveniently be reckoned over any stated period as the product of length of cut by number of incisions. This standard ignores many factors: depth of tapping, thickness of shaving (bark consumption), slope and direction of cut, age of renewal, bark thickness etc.; but these factors are not easy to measure and their individual effects cannot at present be gauged in advance. The proposed standard has the advantage of simplicity. It gives an index to severity of tapping which can readily be determined from data normally recorded on an estate.

Absolute intensity may then be calculated and expressed in full-circumference units by multiplying the length of cut by the average number of incisions (tappings). When records are examined it soon becomes apparent that severity of tapping on one and the same system varies according to season, locality and policy. The number of tappings in the year on the normal ½S,a.d. system in Malaya may vary from a maximum of about 180, when crop is needed, to a minimum of about 130, when crop is restricted. Absolute intensity, measured on the proposed scale, might thus vary from 90 to 65 (or even go beyond those limits)—on the same tapping system; absolute intensities can be compared only when the actual performance of two areas is considered in relation to the actual number of times each has been tapped.

In passing, the importance of calculating absolute intensity on the *average* number of incisions per tree in the period chosen and *not* on the actual number of tapping *days*, should be emphasised. Under Restriction, there is a tendency to neglect replacement of a tapper who is absent for a day or two on account of sickness or other cause, so that in practice 100% of the scheduled tasks are seldom tapped. This point is often overlooked when the number of tappings is reckoned but proper allowance should be made for the proportion of tasks left unfilled.*

(b) *Relative intensity*

While absolute intensity, calculated from the average number of tappings, integrates the tapping history of the trees and may, as we have seen, vary for the same system between wide limits, relative intensity is designed to provide a *comparative* index on a centesimal scale.

The system chosen as standard (100%) is our normal alternate-daily tapping on a half-circumference cut without rest: ½S,a.d.100%. Relative intensity is not an absolute figure; it gives a key to

* For example, a field of ten tasks may actually be tapped on 160 days in the year. If, on reference to the wage book, the total number of tapper/days is found to be only 1556 instead of 1600, the difference being accounted for by absentee tappers, the average number of tappings should be reckoned as 155.6 (and not as 160) in determining absolute intensity.

the cost of a system in terms of wages, bark consumption and probable effect on the trees, relative to the chosen standard. It assists a quick forecast of how one system should compare with another under otherwise similar conditions.

In the new notation, relative intensity, summing up in one figure the integration of the preceding symbols, should be appended to each formula—as in the standard example above. Details of the method of reckoning relative intensity are given in the next article (p. 166). It will suffice to mention here the relative intensities of a few tapping systems:

133% – 1/3S,d.

107% – ½S,d,1/1m. (with estimated average of 28 tappings plus 2 days "flying start" per tapping month)*

100% – S,d,1/1m. (without "flying start")
½S,a.d.
1/1S,4d.
1/1S,3d,3/1m.
2/2S,4d.

75% – ½S,a.d,9/3m.

67% – ½S,d,20/40d.
½S,a.d,6/3m.
½S,3d.
1/3S,a.d.
2/2S,3d,3/3m.

50% – ¼S,a.d.

We can now see that statement of relative intensity clarifies appreciation of tapping systems and provides a convenient basis for classification. For instance, the periodic groups mentioned above (p. 149) can be redistributed into certain main categories according to intensity of tapping (100%, 75%, 67%, 50% etc.). On this basis the common alternate-daily periodic systems of Malaya (our former A.B., A.B.C. and A.B.C.D. tapping) would be designated as alternate-daily periodic tapping at 50%, 67% and 75% intensity respectively. Abbreviations suggested for these subclasses are "a.d,P,50%, a.d,P,67% and a.d,P,75%" (or "2d,P,50% etc."). Similarly, the daily periodic systems might be termed "d,P."

*In Sumatra it is customary to reopen the cuts at the end of each resting period with a "flying start" of two afternoon tappings: this is not practised in Malaya where the intensities of daily periodic and continuous a.d. tapping are usually the same.

tapping, the third-daily periodic "3d,P." and so on, the systems within each group being then placed in their correct main categories according to relative intensity.

The above categories and sub-classes are more explicit that the old A.B.C. groups, which did not give an accurate indication of intensity. For example, "A.B. tapping" in Sumatra covered d,l/lm. systems both on ½S cuts at 100% intensity and on 1/3S cuts at only 67%. Although, on the former Malayan notation, "A.B.C. tapping" usually referred to an alternate daily periodic system at 67% intensity there was no reason why the term should not be stretched to cover equally a very mild system such as 1/3S,a.d,6/3m,44%, or a drastic system such as ½S,d,30/15d,133%.

For this reason, it is strongly urged that the terms "A.B.C. tapping" etc. be abandoned in reference to groups of systems, no less than in the notation itself, and replaced by general terms such as a.d,P,67%. Though it may be some time before everyone can be persuaded to drop these familiar letters, we hope that even diehards will define their abbreviations explicity and give in reports and articles at least one reference in terms of standard symbols. The familiar phrase "daily alternate-monthly" may still be used, but "d.a.m.," "D.A.M." and "o.d.a.m."* should be replaced by the symbols d,1/1m: the group to which this system belongs is daily periodic or "d,P. tapping" but the category into which the system falls will depend on the length of cut—as indicated above, where the sub-classes "d,P,100%" and "d,P,67%" were mentioned.

(7) Change-over tapping

On change-over systems of tapping there is a rhythmic alternation or rotation of panels in contrast to our usual "straight" tapping where each panel is completely tapped out before the cut is turned over to the next. The intervals at which the cut is changed may vary from a day to a year; whereas with straight tapping the cuts would be turned over at intervals of three to four years and upwards. Here again, the distinction (between straight and change-over systems of tapping) is in degree rather than kind, except that a change-over system has more "active" cuts on the tree than are tapped at each tapping.

Change-over tapping does not properly come under periodic tapping. Both continuous and periodic change-over systems are practised. Its essential characteristic is panel periodicity, whether the trees are tapped on a continuous or on a periodic system. The panel periodicity is independent of length, type of cut and frequency and does not affect the relative intensity of tapping. It is a superimposed factor which does not modify the others. For this reason we have decided to indicate change-over systems by inserting *in brackets*, after notation of frequency, the number of panels tapped in rotation and the period of tapping each panel. Thus (2×6m), (3×3m), (2×2d) indicate respectively "two panels,

* Dutch abbreviation for "om de andere maand"

each tapped for alternate six-monthly periods," "three panels, each tapped for three-monthly periods in rotation," "two panels, each tapped for alternate two-day periods" and so on.

For convenience of exposition change-over tapping is divided into (a) single-cut and (b) multiple-cut systems.

(a) *Single-cut change-over tapping*

To keep the notation consistent with intensity of tapping, systems with only one cut tapped at a time should be classified as single-cut tapping. This conception is logical and avoids complications, even in the extreme case when two panels are tapped concurrently. For example, a change-over system with alternate-daily tapping, alternately on opposite half-spiral cuts, should be designated as ½S,a.d,(2×2d),100% (*not* as 2/2S etc.).

(b) *Multiple-cut change-over tapping*

Multiple-cut systems, such as are sometimes used in slaughter tapping, should also be designated according to the number of cuts tapped at a time, not according to the total number of "active" cuts on the tree. When, for example, two half-cuts, out of four per tree, are tapped daily, the system would be represented by 2/2S,d,(2×1d),400%.*

IV. Other Factors in Tapping

Symbols to represent a number of other factors associated with tapping have been omitted, for fear of making the standard notation too cumbersome. Of these, height of tapping is perhaps the most important owing to its influence on yield. The provision of a standard form for recording factors which contribute to the tapping system, other than those provided for in the notation, is desirable, particularly for tabulation with yield records (vide Section V). For completeness, concise forms of recording each of these factors will now be mentioned. It should be understood, however, that the symbols suggested in this section do not form part of the agreed international notation, but are merely put forward here for consideration.

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* Compare this with 4/2S,a.d,400%, denoting that all four cuts are tapped simultaneously on alternate days. not a change-over system. Assuming that there are two cuts on each side of the tree, this formula could be written in full as ½+½—½+½S,a.d,400% (or as ½—½+½—½S etc.).

On the same assumption the change-over system 2/2S,d,(2xld)400% could either be amplified to ½—½S,a.d+½—½S,a.d,400% or ½+½S,a.d. —½+½S,a.d,400% indicating respectively that pairs of superimposed cuts or pairs of opposite cuts were tapped together. Note from these examples that when the formula is written in full the frequency of tapping the cuts should be given, not the frequency of tapping the trees.

(a) *Slope of cut* is commonly expressed, in degrees, as the inclination to the horizontal. Most estates have their own standard slopes, budded trees usually being tapped at a steeper slope than seedlings (say at 25-35° and 20-25° respectively). Special mention of angle of inclination may therefore not seem necessary except when it differs from the selected standard. Nevertheless, slope of cut should be recorded in published reports on tapping experiments or in yield tables compiled from a number of estates where the practice may not be uniform.

(b) *Direction of cut.* Preference for the left-to-right spiral is almost universal, so that there is seldom any need to mention the direction of cut. Similarly, when a half-V cut is extended to a full circumference, the left half of the V is usually prolonged upwards. Where, for some reason, a spiral cut is placed from right (top) to left (bottom) or the right, instead of the left, half of an extended-V cut is prolonged, the symbols R/L could be recorded with the angle of inclination. In general, the symbols L/R need not be inserted, left-to-right cut being understood when the contrary is not indicated.

(c) *Depth of tapping* is mainly of interest in relation to bark thickness. When desired, the two might be expressed together (in millimetres), for example thus: 6½/8 mm. (=tapping to a depth of 6½ mm. on bark of 8 mm. total thickness).

(d) *Type of bark.* The letters v.b. and r.b. are sometimes used in this country to indicate whether tapping is on virgin or renewed bark. This notation could be extended to show whether tapping is on first, second or third renewal (=r1b., r2b. or r3b.); but the relation of the cut to old panels is best shown by a history chart, which is rather outside the scope of the present article.

(e) *Height of tapping* is conventionally measured from the lowest point of the cut to ground level (on seedling trees) or to the union (on budgrafts). In Malaya it is customary to state this measurement in inches. Centimetres would be preferable as they are units small enough to dispense with the need for fractions. Choice of unit must be left to individual discretion, but the unit should always be stated.

When recording yields, the height of tapping at the beginning and end of the period should be set down (see p. 155). If there has been a change of panel, the height of stopping the old and of opening the new panel should be stated. When tapping on double-cut systems it is necessary to record two sets of height figures.

(f) *Bark consumption* is generally expressed in Malaya in inches per mensem or in inches per annum. Here again, centimetres

would be preferable. Measurement of annual bark consumption to the nearest centimetre is sufficiently precise for ordinary purposes; it is more accurate than to the nearest half inch. The monthly rate of consumption would best be expressed to the nearest millimetre, thus avoiding awkward fractions.

Although height of cut and bark consumption do not form an essential part of the tapping system itself, they can be introduced at the end of the standard formula when required. It is suggested that height figures should be prefixed by the letter h and that the quantity of bark consumed during the given period (and the unit of measurement) should follow in brackets thus:

h75—52(23cm.) = cuts at height of about 75 cm. at beginning of period and 52 cm. at end, corresponding to a bark consumption of 23 cm.

h6—3/30—24(9″) = initial low cut tapped from 6″ to 3″, turned over to new panel tapped from 30″ to 24″, corresponding to a total bark consumption of 9″ during the period.

h35—30 & 16—11 (5″ + 5″) = one cut tapped from 35″ to 30″ and the other from 16″ to 11″ with a bark consumption of 5″ on each cut: a double-cut system with a total bark consumption of 10″.

Example of an amplified formula

Finally, an example may be cited to show how the notation could be amplified by adding the suggested symbols to the standard formula, when it is required to record all the above information:

½S,a.d,100% at 25°L/R on 7½/9mm.r2b., h21—4 80—72 (25cm.).

This would be short-hand for a much longer description:

"Half spiral tapped alternate-daily, relative intensity of 100%, with left-to-right cut at an inclination of 25° to the horizontal on second-renewal bark with a thickness of 9 mm., tapped to a depth of 7½ mm.—initial low cut tapped from 21 cm. to 4 cm., turned over to new panel tapped from 80 cm. to 72 cm., corresponding to a total bark consumption of 25 cm. during the period."

V. Tabulation of Yield Records

The international notation for tapping systems has been standardised for the benefit of the planting community no less than the scientist. On the technical side it is scarcely necessary to point out the convenience of a standard notation for scientific journals. On the commercial side the notation should assist in compilation of estate records. Although methods of tabulating yields are a little beyond the scope of the present article, some brief ideas on the subject will not be out of place here.

The status of a rubber estate is determined and its future policy guided by past records of yield. Yet, yield tables are often inadequate, unreliable and misleading owing to failure to maintain an intelligible record of tapping systems, resting periods, height of tapping etc. Sometimes, too, the significance of records is obscured by accumulation of a mass of unnecessary detail along with essential information. Anyone who has attempted to make sound deductions from the general run of estate records may have been struck by the hopelessness of his task.

Now, it is as easy to compile useful data as worthless, provided we envisage essential details and record them on a standard scheme. Indeed, it is much simpler, since we can eliminate all unnecessary data. Another advantage of keeping standard records on estates is that data compiled over a period of years by a zealous manager would not be marred, as so often now, by the omission of one or two essential details; nor would his efforts be dissipated by a successor with different notions.

A step in the right direction will be to enter tapping systems in field history files on the standard notation. This, of itself, would much increase the utility of yield tables. Other steps would be to standardise the form of yield tables and to adopt a standard type of chart showing bark position in relation to tapping history.

The following notes and suggestions are put forward with the idea of encouraging further discussion and in the hope of some day reaching general agreement. As with Section IV, they should be understood to represent the writer's personal views at the moment—not necessarily his final views nor an accepted scheme on which general agreement has been reached.

(1) Yield

Actual crop harvested (total dry rubber in pounds per acre or kilograms per hectare*) should be recorded in preference to calculated annual rate of yield, even for tapping periods of less

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* Fortunately, figures calculated on either of the above sets of units differ by less than 10% so that rough conversion from one rate to the other is quite simple. To convert yields in kilograms per hectare to pounds per acre multiply by 0.892 (roughly, deduct one tenth); to convert pounds per acre to kilograms per hectare multiply by 1.121 (roughly, add one eighth).

The writer would like to see metric units used in all scientific publications, whether or not imperial units are given as well. Thus might encourage abandonment of the clumsy units still used in the British Empire, for example, the reckoning of areas in acres, roods and square rods, poles or perches.

than a year. The percentage of crop represented by lower grades should also be noted.

Failure to note changes of area is a common source of error in commercial yield records. Variation in the size of a field designated by a given estate number is not uncommon: corrections are seldom noted when small alterations are made. Corners or strips may be cut off from a field for buildings, roads or nurseries: in replanting, waste land and margins of drained swamps may be planted up. Sometimes, two fields are amalgamated under the number previously applied to one—or part of a field may be brought into tapping one year and the opening of the remainder deferred to the next. Discrepancies in yield records can often be attributed to neglect of points such as these.

(2) *Age*

Age of trees, whether of seedlings or budgrafts, is best reckoned from the year in which planting *began*.* Even when planting has extended over several seasons no attempt should be made to determine an average date, provided the whole area was originally planted up together; only when several fields have been planted progressively over a period of years and then amalgamated for tapping at maturity should the average year (when planting began) be used.

It is immaterial whether yields are summarised for tabulation under calendar years, financial years or other periods so long as the age classes are regular. The simplest way to reckon age is to consider the year in which planting began as "year O," the first *complete* year as "year 1" and so on. Year 1 can then be considered as the first year of life, ignoring the few odd months of year O which may have preceded it.†

It may be objected that where planting takes place in the early planting season (April—May) and yields are tabulated under calendar years—the commonest periods used in this country—the convention to reckon year of planting as O, introduces too large an error. Against this, it may be argued that trees planted in the early season usually do not reap the full benefit of six months extra growth. Moreover, accurate reckoning of age is often difficult, or impossible, owing to prolonged supplying, delayed budding and other complications. The proposed convention would introduce a systematic error into age which might amount on the average to a maximum of six

* This, after all, is the economic starting point of the rubber, whether the trees are to be budded or not. That a different starting point has been selected for the purpose of assessment under the Rubber Restriction Scheme does not affect the issue.

† The procedure adopted in Sumatra of reckoning age as "year of life" is similar. Dr. d'Angremond writes in Communication No. 98 (Rubber Series) of the A.V.R.O.S.—"*To avoid misunderstanding.....all yield data are given as for a certain* year of life. *A child lives immediately after its birth in the first year of life, celebrates at the end of that its first birthday and enters its second year of life.....*"

months, though, in practice it would probably not work out at more than three or four months.††

For yields tabulated under calendar years, year of life is readily determined by substracting the calendar year in which planting began from the year covered by the records. For yields tabulated under such periods as financial years, which overlap into two calendar years -usually recorded in the form 1930-31 (April 1930 to March 1931 inclusive, for example), 1931-32 etc. the same convention can be used: the financial year in which planting began should be determined and subtracted from the financial year covered by the records.*

Much time can be saved in this way by ignoring unnecessary detail. So long as a standard procedure is adhered to, adjustments can be made when required. The proposed convention is as accurate as any other and has the advantage of simplicity: year of life would be reckoned by simply subtracting the year in which planting began from the year covered by the records.

(3) Length of tapping period

Where tapping has been periodic, the number of resting months should be set down; details of the actual months covered by tapping periods also help to elucidate anomalies due to season.

In tapping experiments it is customary to subdivide plots into their own A, B, C.....sections for periodic tapping so as to avoid seasonal fluctuations. In field organisation for commercial tapping this may not be practicable, since it is usually required to rest a whole section of the estate at a time; but, sometimes, areas of similar age and character can be combined from the various sections for periodic tapping into one unit. Where this can be done, the trend of yield is less obscured.

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†† If planting dates were distributed at random round the year and no vacancies "supplied" the average error would be exactly six months. The calendar years would cover periods systematically ½ year older than the reckoned year of life; since year 1 would extend from six months old to eighteen months old on the average, the mean age would be 1.

In practice, owing to the preponderance of Oct./Nov. plantings and the large proportion of "supplies" sometimes planted in subsequent months, it is doubtful whether the systematic error would be as great as ½ year (e.g. year 1 might be more correctly year 1¼ and average age would be only ¾, not 1). This small error is of little consequence.

* Two examples will make this clear:

(a) Planting started in September 1930 on Estate A where yields are tabulated in financial years extending from 1st October to 30th September inclusive. Planting year would then be taken as 1929-30.

(b) Planting also started in September 1930 on Estate B where the financial years extend from 1st July to 30th June inclusive. Planting year would here be reckoned as 1930-31.

Yields for the period 1936-37 would therefore be placed under the 7th year on Estate A (i.e. 1936-37 minus 1929-30: subtract first of figures denoting each financial year '36—'29 = 7) but under the 6th year on Estate B.

(4) Number of trees tapped

Total stand of trees is generally noted in estate records; the number of trees tapped should also be recorded. In fully mature areas, where the majority of trees are in tapping, the two figures may be roughly the same; in immature areas, where only say 50—60% of trees are tappable, failure to record this figure invalidates comparison of yield per tree.

Task size and nationality of tappers should also be noted; both will be reflected in tapping costs and may affect yield as well.

(5) Number of tappings

The average number of tappings per task should be recorded with the total number of tapping days. This has already been discussed above (p. 150), where it was emphasised that calculation of the average number of tappings should include allowance for the proportion of vacant tasks. It is suggested that these data be recorded in the form of the following example: 320/155.6 (=tapping on 320 days in the year/average number of tappings per task 155.6).

(6) Tapping systems

Yield tables should henceforth be accompanied by full details of tapping system on the standard notation with addition of the figures for height of tapping and bark consumption. Other factors mentioned in Section IV are best recorded on a bark chart, which should be kept up to date.

When the tapping system has changed in the middle of a year separate data should be kept for each period under all the above headings.

(7) Absolute intensity

Having recorded the full data, absolute intensity may be calculated from the *average* number of tappings and length of cut. It is further suggested that yield figures, whether covering annual periods or periods shorter than a year, should invariably be accompanied by the corresponding figure denoting absolute intensity of tapping. Total intensity, the summation of the whole tapping history of the tree since maturity, should be recorded against aggregate yield.

The following examples indicate the values for absolute intensity that different tapping systems may give over a period of one year:

	Tapping System		Average number of tappings recorded	Absolute intensity
(1)	½S,a.d,100%	Estate A ...	178	89
(2)	½S,a.d,100%	Estate B ...	124	62
(3)	1/1S,4d,100%	... ...	85	85
(4)	2/2S,4d,100%	... ...	82	82
(5)	1/3S,a.d,67%	... ...	156	52
(6)	½S,3d,67%	... ...	120	60
(7)	½S,a.d,12/6m,67%	... ...	182	91

The final example illustrates that over a given period—clearly, in this case, a full year's tapping without rest—severity of tapping on a periodic system at relative intensity of 67% may be as great as on systems of higher relative intensity. Contrast the absolute intensities of 91 and 89 over the given year in examples (1) and (7) with their hypothetical values for relative intensity (67% and 100% respectively); on a periodic system relative intensity must be estimated to cover a full cycle of tapping and rest. Note also the different intensities of tapping on the two estates in examples (1) and (2), both tapped on the same system at a relative intensity of 100%.*

(8) Yield per unit tapping

A further development which follows naturally from the conception of tapping intensity is the calculation of a figure we might term "yield per unit tapping," i.e. yield per unit of tapping intensity. This figure would be derived from the total yield in any given period, on dividing by absolute intensity over the same period.† Yield per unit tapping might either be calculated in pounds per acre or kilograms per hectare or in grams per tree.

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*Assuming a productive life of 24 years and tapping on a system at relative intensity of 100% (such as ½S,a.d.) on a standard panel 36″ long with mean bark consumption of 9″ per annum, three full bark cycles would be completed. On the same system, but with a higher bark consumption, say 12″ per annum, the third cycle might be finished by the end of the 18th year, allowing time for the completion of a fourth bark cycle before the end of the 24th year.

The relative and absolute intensities would be the same in both examples. It is impossible to say how yields would be affected; Assuming that bark consumption is unnecessarily high but that sufficient time is allowed for renewal in the second example, yields would probably be the same. Note that the proposed basis for calculating intensity rests on the tacit assumption that length by number of incisions has a much greater influence on yield than other factors such as bark consumption.

†Although yield per unit tapping could be calculated from short periods, figures derived from an insufficient number of tappings would be open to the usual objections: namely, that they might represent exaggerated seasonal fluctuations, or periods of flush yield after rest and so on.

For comparative purposes the value of reducing yields to unit tapping intensity is obvious. Comparisons of yield per acre are often complicated by differences in the number of tappings, which obscure the trend from year to year; comparisons of yield per tree per tapping are similarly confused by changes of tapping system.‡ Yield per tree per unit tapping would be proportional to yield per tree per tapping on a uniform system, but would have the additional advantage of eliminating complications when the tapping system is changed. It would provide a single figure integrating the effect of tapping on yield.

Complete elimination of all variable factors would be difficult, perhaps impossible, since it would be necessary to integrate also height of tapping, fluctuations caused by flush yields after rest, and so forth. Yield per tree or per unit area *per unit tapping* would, however, be a considerable advance on the usual bare expression of yield per tree per tapping or yield per acre or hectare, which ignores variable factors such as those mentioned above.

VI Discussion

In this section a broad classification of tapping systems is given. The table (table 1) is by no means comprehensive, but indicates the wide range of tapping systems used in rubber-producing countries. The possible number of combinations and permutations of different factors is large. Some blanks in the table could no doubt be filled by examples from current systems unknown to the writer; new systems could readily be devised to fill others.

The standard notation has been devised to provide a single scheme for representing tapping systems concisely by international symbols. Complicated as the formula for an intricate system may appear, the single value for relative intensity, gives an immedaite clue to its severity: that is, to its probable effect on the trees and to the yield it might reasonably be expected to give in comparison with other systems. Moreover, anyone familiar with the notation can work out the meaning of the symbols for himself, however complicated the formula.

The standard notation should henceforth eliminate time wasted either in the effort to be clear or in the attempt to extract precise meanings from inadequate or ambiguous descriptions, sometimes

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‡ For example, the yield per tree per tapping on 1 1S.4d.100% may be roughly double the yield per tree per tapping on ½S.a.d.100% c, though the intensity of both systems is the same.

TABLE 1 *Broad Classification of Tapping Systems*

(showing some of the combinations of factors involved in the tapping of rubber trees)

Frequency	A. Straight Tapping (continuous on panel)			B. Change-over Tapping (periodic on panel)			
	Length of cut/cuts	Periodicity (on trees)	Relative intensity	Length of cut/cuts	Periodicity		Relative intensity
					on trees	on panels	
1. CONTINUOUS SYSTEMS							
d.	¼	nil	100%				
	1/3		133%				
	1/3		67%	1/3		(3 x 6m)	67%
2d.	½	nil	100%	½	nil	(2 x 2d) (2 x 9m)	100%
	2/4		200%				
	2/2		400%	2/2		(2 x 2d)	200%
	4/2		44%				
	1/3		67%				
3d.	⅓	nil		½	nil	(2 x 6m)	67%
	1/1		133%				
	2/2						
4d.	1/1 2/2	nil	100%				
2. PERIODIC SYSTEMS							
	1/3	1/1m.	67%				
		20/40d.	67%				
d.	½	15/15d.	100%	½	15/15d.	(2 x 15d)	100%
		1/1m.					
	1/1	10/20d.	133%				
	1/3	4/2m.	44%				
		4/4m.	50%				
2d.	½	6/6m.		½	12/6m.	(2 x 6m)	67%
		4/2m.	67%				
		12/6m.					
	1/1	1/1m.	100%				
	1/2	9/3m.	50%				
		3/3m.	67%				
3d.	2/2	7/7m.					
		8/4m.	89%				
		12/6m.					
	1/1	3/1m.	100%				
	2/2	6/3m.	67%				
		12/6m.					
4d.	...	...	...				
	1/1	9/3m.	75%				
		12/4m.					

Some of these systems are rarely used now. The more drastic systems (200%) are used in slaughter tapping, the very mild ones (44-50%) in poor areas under Restriction.

Where two alternatives are given in one space they indicate the approximate range occurring in practice.

in a foreign language. It should help to avoid confusion which often results from the misinterpretation of records kept on no fixed standards.

Although standardisation of the notation for tapping systems only has been accomplished at present, it is hoped someday also to devise and introduce a standard form for tabulating yields and allied information along lines suggested in other sections of this article.

Acknowledgments

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Kuala Lumpur

8th September, 1939

A STANDARD INTERNATIONAL NOTATION

for

SYSTEMS OF TAPPING HEVEA

By

Evan Guest

Summary

Details are given of the new standard international symbols to represent tapping systems, together with examples of their use. (A full discussion of the reasons for introducing this standard notation, and of other related questions, forms the subject of the preceding Communication (No. 239)).

The Standard Notation

It is proposed to introduce a standard notation to describe tersely and explicitly the various systems of tapping rubber trees. The notation consists of a set of symbols which should be used in regular sequence to define respectively:

(1) the number of cuts tapped on each tree at each tapping,
(2) the length of each cut,
(3) the type of cut,
(4) the frequency of tapping

and, in periodic systems,

(5) the lengths of the periods of tapping and rest.

In addition, a figure denoting

(6) the relative intensity of the system

should accompany the standard symbols.

Special symbols are also provided for insertion when it is desired to indicate

(7) change-over systems of tapping.

(1) Number and (2) Length of Cuts

To be expressed in the form of a fraction:

(a) the numerator to denote the number of cuts tapped on each tree at each tapping

and (b) the denominator to denote the horizontal length of each cut expressed as a fraction of a full circumference (that is: 2 for ½ circumference, 4 for ¼ etc.).

Examples:

½, 1/3 or ¼ = one cut on half, third or quarter circumference,
1/1 = one full-circumference cut,
2/2 or 2/4 = two cuts, each on half or quarter circumference and 4/2 = four half-circumference cuts.*

(3) Type of Cut

Only two types of cut are in common use at the present day, the spiral and the V cut.

To be designated by the capital letters
S = spiral cut
and V = V cut.

Where the type of cut is unrecorded these symbols can be omitted without affecting the remainder of the notation. The type of cut may not be of great importance, but should generally be recorded.

(4) Frequency of Tapping

To be expressed in terms of the daily interval between tappings, thus (in small letters):

d = daily,
a.d. or 2d = alternate-daily (= every second day),
3d = every third day,
4d = every fourth day

and so on.

To describe possible systems with tapping two or more times daily, the symbols dd, ddd etc. can be used, if required.

(5) Length of Periods of Tapping and Rest in Periodic Systems

To be expressed by two numbers denoting respectively the periods of continuous tapping (at the stated frequency) and of rest, followed by either the small letter

d = days,
w = weeks
or m = months

to indicate the unit in which the period is reckoned.

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* Can also be written in full, if desired, as ½ + ½ $(=\frac{1+1}{2}=2/2)$.
For further refinements, see under "Some Amplifications" (p. 168).

Examples:

20/20*d* = *twenty days' tapping followed by twenty days' rest,*
6/3*w* = *six weeks'* „ „ „ *three weeks'* „
12/4*m* = *twelve months'* „ „ „ *four months'* „
8/2*m* = *eight* „ „ „ „ *two months'* „
3/1½*m* = *three* „ „ „ „ *one-and-a-half months' rest.*

The former symbols A.B., A.B.C. etc., indicating the number of sections into which an area is subdivided for periodic tapping, should be omitted. They can be deduced from the periods of tapping and rest. Thus, on the old Malayan notation, the above examples would represent A.B., A.B.C., A.B.C.D., A.B.C.D.E. and A.B.C. systems respectively. The reasons for abandoning these symbols are that they have been applied differently in Malaya, Ceylon and the N.E.I.: they are clumsy, redundant and ambiguous. Even as general terms they are better replaced by the more precise conception of intensity described below.

(6) Relative Intensity of Tapping

To be expressed as the percentage of the intensity on the ½a.d. system (reckoned over an equal tapping period and, in periodic systems, covering a full cycle of tapping and rest).

Examples:

Tapping system	Percentage of area		Percentage of trees tapped per day *(= column 3, divided by the "frequency")*	Total length of cut per tree *(as fraction of circumference)*	Mean percentage of total circumference tapped per day *(= column 4 x column 5)*	Relative intensity *(expressed as percentage of ½a.d.)*
	resting	in tapping				
1	2	3	4	5	6	7
½*S,a.d.*	*nil*	100	50	½	25.0	100
1/3*S,a.d.*	*nil*	100	50	⅓	16.7	67
½*V,3d.*	*nil*	100	33	½	16.7	67
¼*S,a.d.*	*nil*	100	50	¼	12.5	50
1/1*S,4d.*	*nil*	100	25	1	25.0	100
½*S,a.d,6/3m.*	33	67	33	½	16.7	67
2/2*V,3d,3/3m.*	50	50	17	1	16.7	67
½*S,d,20/20d.*	50	50	50	½	25.0	100

For tabulation with yield records *absolute* intensity is a more valuable index than relative. Absolute intensity can be reckoned as the product of

the length of each cut and the total number of individual incisions (tappings), thus expressing the aggregate length of incision in full circumference units*. In the standard notation, however, *relative* intensity is the better scale against which the severities of different tapping systems can be compared at a glance.

(7) Change-over Systems

To be designated by the insertion of special symbols *in brackets*.

Since these are systems of tapping commonly practised in Ceylon (and sometimes in the Netherlands East Indies), but not hitherto in Malaya, details of change-over symbols have been deferred to the special section on p. 169. Change-over systems are distinguished by a rhythmic alternation or rotation of tapping on successive panels at intervals of from one day to a year, in contrast to ordinary "straight" tapping on which each panel is completely tapped out before the cut is turned over to the next. Those not interested in the change-over notation may skip the final section of this article.

Some Examples of the Full Notation

The symbols explained above should always be used in the same sequence, thus:—

(1) ½V,a.d,100% = a half-V cut tapped alternate-daily.

(2) 1/3S,a.d,67% = a third-spiral cut tapped alternate-daily.

(3) ½S,a.d,12/6m,67% = a half-spiral cut tapped alternate-daily for twelve months, followed by six months' rest. (One of the common A.B.C. systems on the old notation in Malaya).

(4) 1/3S,d,40/20d,89% = a third-spiral cut tapped daily for forty days, followed by twenty days' rest. (Also an A.B.C. system on the old notation, but with daily instead of a.d. tapping and a shorter cut. Note the difference in intensities of examples (3) and (4), ignored on the old notation).

(5) ½S,3d,12/4m,50% = a half-spiral cut tapped every third day for twelve months, followed by four months' rest. (An A.B.C.D. system on the old Malayan notation).

(6) 2/2S,4d,100% = two half-spiral cuts tapped every fourth day. (The "Double Four" system).

(7) 2/2V,3d,5/5m,67% = two half-V cuts tapped every third day for five months, followed by five months' rest. (One of the "Sunderland" systems).

(8) 2/2V,3d,15/10w,80% = two half-V cuts tapped every third day for fifteen weeks, followed by ten weeks' rest.

* For further details of *absolute intensity*, see p. 150 in the preceding article (Communication 239).

(A rather more intensive modification of the Sunderland system. On the old Malayan notation this could be described as an A.B.C.D.E. system with two out of the five sections always resting).

(9) 1/1S,3d,3/1m,100% = a full-spiral cut tapped every third day for three months, followed by one month's rest.

(10) 1/1V,4d,100% = a full-circumference extended-V cut tapped every fourth day.

(11) ½S,d,1/1m,12/6m,67% = a half-spiral cut tapped daily alternate-monthly for twelve months, followed by six months' rest. (A system sometimes used in Sumatra: showing how a periodic system within a periodic system can be symbolised on the standard notation).

(12) 4/2V,a.d,400% = four half-V cuts tapped alternate-daily. (An example of a system used in slaughter tapping).

Some Amplifications of the Notation

Sufficient examples are quoted above to show that the standard notation can cover all or nearly all the tapping systems in common use. For those who wish to extend it and discriminate between some of the more intricate variations of multiple-cut systems, further refinements can be devised. A simple convention is also proposed to distinguish the "change-over systems" of Ceylon from ordinary systems of continuous tapping.

Multiple-cut Systems

Where it is particularly desired to indicate the position of the cuts in a double-cut or multiple-cut system, the fractions denoting individual cuts can be written in full, using the following conventional signs:

/ (stroke) = cuts in echelon on adjacent panels,
+ (plus) = „ on opposite sides of the tree,
and − (minus) = „ superimposed one above the other on the same panel.

Examples:

¼/¼S,a.d,100% = two quarter-spiral cuts in echelon tapped alternate-daily. (This could be simplified to 2/4S,a.d.),

¼+¼S,a.d,100% = two quarter-spiral cuts on opposite panels tapped alternate-daily. (Also = 2/4S,a.d.),

½—½V,a.d,200% = two half-V superimposed cuts tapped alternate-daily (= 2/2V,a.d. — a form of slaughter tapping)

and *½—½+½—½V,a.d,400% = four half-V cuts (two superimposed on each of the two opposite panels), tapped alternate-daily (=4/2V,a.d. — a more drastic form of slaughter tapping).*

Change-Over Systems

To be indicated by the insertion of special symbols placed *in brackets* immediately after the notation of frequency; these special symbols to denote the number of alternating panels per cut and the length of the period tapped on each panel (at the stated frequency), in the form shown below:

(2 × 6m) = change-over system with two panels tapped alternatively, each for a six-monthly period at a time.

(3 × 3m) = change-over system with three panels tapped in rotation, each for a three-monthly period at a time.

Examples:

(1) ½*S*,*a.d*,(2x6*m*),100% = *change-over system: continuous alternate-daily tapping on a half-spiral cut on the trees, but with tapping periods of six months on each of two alternating panels.*

(2) ½*S*,*a.d*,(2x2*d*),100% = *as (1) above, but with tapping periods of only two days (at the stated frequency) on each of the two alternating panels—that is, with alternate tappings on alternate panels.*

(3) 1/3*S*,*a.d*,(3x6*m*),67% = *change-over system: continuous alternate-daily tapping on a third-spiral cut on the trees, but with three panels tapped in rotation, each for a six-monthly period at a time.*

(4) ½*S*,*a.d*,(2x2*d*),6/3*m*,67% = *periodic change-over system: alternate-daily periodic tapping on a half-spiral cut on the trees, with periods of six months' tapping and three months' rest and with alternate tappings on alternate panels, as in (2) above.*

(5) ½*S*,*a.d*,(2x6*m*),6/3*m*,67% = *as (4) above on the trees, but with tapping periods of six months on each of the two alternating panels.*

(6) ½*S*,*d*,(2x2*w*),2/2*w*,100% = *daily periodic tapping on a half-spiral cut on the trees, with fortnightly periods of tapping and rest, and with alternate tapping periods on alternate panels.*

(7) 2/2*S*,*a.d*,(2x2*d*),200% = *double-cut change-over system: continuous alternate-daily tapping on two half-spiral cuts on the trees, but with alternate tappings on two pairs of alternating cuts—that is a system with four cuts on the trees of which only two are tapped at a time, such as is sometimes used in slaughter tapping.*

Note that in each of the above examples the main part of the formula, outside the brackets, is unaffected by the change-over symbols within. The numerator of the initial fraction still denotes the number of cuts tapped on each tree at each tapping, not necessarily the total number of "active" cuts on each tree during any given period. The total number of cuts on the change-over system is indicated by the product of the first number inside the bracket and the numerator of the initial fraction in the formula. Thus in examples (1), (2), (4), (5) and (6) there are two cuts, and in example (3) three cuts, of which only one is tapped at a time, while in example (7) there are four cuts which are tapped in pairs at a time.

Note also that the period given within the bracket is the length of the period *tapped* on each panel *at the stated frequency* and in periodic systems does not necessarily coincide with the interval between changes of panel. Reference to example (6) will make this clear; the change of panel takes place every four weeks, of which two constitute a resting period—hence the system is expressed by (2x2w), not by (2x4w). But compare example (4) which is written (2x2d), not (2xld), since with alternate-daily frequency a two-day period denotes a single tapping.

Kuala Lumpur

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